

# Agrobiodiversity Products by SWOT Analysis as an Analysis for Strategic Innovation

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**Abstract:** The paper aimed to demonstrate the potential of agro-biodiversity products derived from medicinal plants of the family farmers in Profito network (specific program of the Brazilian government). Method used was scenarios analysis of the knowledge. Literature review it was in the scientific database. According to the new “green wave” created by contemporary society aiming a better health and quality of life by population, it led to the depredation of medicinal species due to the acceleration of global trade demand. Thus, was constructed a SWOT analysis to support managers in strategic planning through of the potential agro-biodiversity products. It shows the appreciation of environmentally conscious products, economically sustainable and the creation of new public policies that ensure and valuation to the rescue, conservation and sustainable use of biodiversity since they are essential for building this niche market.

**Keywords:** agrobiodiversity; technological innovation; SWOT; knowledge translation; knowledge management.

Submitted: June 2nd 2015 / Approved: December 2nd 2015

## Introduction

According Organization for Economic Co-operation and Development (OECD) innovation is the implementation of a product or service, process or new method significantly improved. Innovative activities involve scientific steps, technological, organizational, financial and commercial (OCDE, 1997). That is, the innovation can arise through a range of variants in the development of new products, services, methods, partners, marketing, and/or during the search for improved products and processes that qualify.

Technological innovation process is closely linked to the history of science, the transformation of knowledge into innovations that affect society, creating organizational competitive advantages at different levels. The context of innovation was introduced by the economist Schumpeter in 1942 describing it as creative destruction by reason of considerable imbalance in the economy (Machado, 2012).

Trend to what is termed as innovation economy emerged after World War II. In the Brazilian economy in the 90s the landmark for opening of the market boosted the internationalization. In this sense, innovation was recognized by acquisition competitive advantages (Machado, 2012).

There has been a growing effort by scholars to establish and implement tools able to investigate innovative strategies to originate competitive advantages such as Porter Forces, Critical Success Factors, SWOT analysis, Balanced Scorecard, Benchmarking and Data Mining so on.

Although there are huge literature on innovation they are still incomplete works that contribute to the green economy based on biodiversity (Villas Bôas, 2013). This fact can be considered as of great impor-

tance in order to be exploited as a source of competitive advantages for biodiversity drugs and its derivatives, primarily in Brazil.

Brazil is shelter to the greatest diversity on the planet. It has more than 20% of the total number of species on earth and it is included among the 17 mega-diverse countries. Biodiversity occupies about 40% of Brazil's GDP (in 1997 estimated at US \$ 866 billion). The biodiversity products account for 31% of Brazilian exports. In addition, much of the population makes use of medicinal plants as therapeutic health practices. This way the value of biodiversity is incalculable given that the conservation and sustainable use are essential for humanity (MMA, 2014).

The term agricultural biodiversity was not explicitly mentioned in the text of the Convention on Biological Diversity (CBD). However, it was more defined by Decision V / 5 of the 5th Conference of the Parties to the Convention, as “[...] a broad term that includes all components of biodiversity that are relevant to agriculture and food; It includes all components of biodiversity that constitute the agro-ecosystems: the variability of animals, plants and micro-organisms, the genetic level of species and ecosystems needed to sustain the key functions of agro-ecosystems and their structures and processes” (CDB, 2014).

Agrobiodiversity combines the three levels of complexity related to biodiversity: farming systems, species, varieties, breeds and cultural diversity. In addition to human interventions which are fundamental to the understanding of agricultural biodiversity, i.e., different management practices of agro-ecosystems, knowledge and traditional agricultural knowledge related with adhibition (Machado, Santili & Magalhães, 2008). In this context of combinations there are components of high interest for sustainable environmental development focusing on rural and local communities, “quilombolas” (this term are the current inhabitants of rural black communities founded by

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escaped African slaves who live mostly on subsistence farming on land donated, purchased or occupied for a long time) and indigenous peoples, representing accumulation of knowledge transmitted from generation to generation.

Studies conducted by the Ministry of Environment on Agricultural Biodiversity and Cultural Diversity, report that in addition to the medicinal and aromatic plants and native seeds there are other forms of use of agricultural biodiversity with great importance to the everyday reality of family farming and traditional communities. This things representing important strategies to generate income and social inclusion among them the agroforestry System (AFS) which support several initiatives scattered throughout the country (MMA, 2014).

Agrobiodiversity is part of the Government' Multiannual Plan (PPA - Brazilian term) for discussions and definitions for the period 2004 to 2007. The reasons taken into Political consideration were: recognition by government of the mainstream communities, family farmers and indigenous peoples, need of government support for strengthening the organization, knowledge and support of the community experiences of conservation and use of agricultural biodiversity. Added to contribute rescuing of the dignity of farmers as active agents of the process of domestication and conservation of plants and animals. When the agro-biodiversity is institutionalized into government, it becomes a priority for the Secretary of Biodiversity and Forests as well as a cross-cutting tool and partnerships with other ministries (MMA, 2014).

In 2003, there were actions and social movements conducted by the population. In this sense, these first actions undertaken gave way for dialogue with social movements and non-governmental organizations linked to agriculture families and local communities. On the other hand, following the guidelines of the MMA, priority was given to the exercise of intersections among federal agencies that operate together with the Ministry of Health and National Health Surveillance Agency (ANVISA - Brazilian term) on issues related to medicinal plants, use of medicines homemade herbal and developing models of clusters of medicinal plants and herbal medicines (MMA, 2014).

Another complementary strategy carried out by federal agencies was the technical and financial support to participate in events aiming the rescue, sustainable use, conservation and enhancement of agricultural biodiversity throughout the national territory such as the First National Meeting on Agricultural Biodiversity and Cultural diversity, held in Brasilia on 28 and 29 November 2003. Furthermore, the growing demands and limitations in financial resources it became necessary a strategic joint covering fundraising and support for project rescue, recovery and sustainable use of agricultural biodiversity. So, it was created the Dissemination Centers of Agricultural Biodiversity Stewardship (CIMAs). These are intended to consolidate activities in five thematic areas among them medicinal plants and herbal products and agroforestry (MMA, 2014).

The National Agricultural Biodiversity Programme came at the time when the rights of family farmers, traditional communities and indig-

enous people to the free use of biodiversity has been recognized and regulated by the international and national agencies. This act has innovative character, it differs in the way it was designed (participation of society from the beginning - especially the National Articulation of Agroecology (ANA - Brazilian term). In June 2006, the Conservation on Biological Diversity (CDB - Brazilian term) and the Treaty on Plant Genetic Resources for Food and Agriculture of the United Nations - FAO (TIRFAA) recognized practices and innovations of these populations as subjects of innovation and breeding of wild biological resources and component cultivated biodiversity, agro-biodiversity during II National Meeting of Agroecology (IIENA - Brazilian term). After that the National Articulation of Agroecology (ANA) through Working Group on Biodiversity together with the Ministry the Environment (MMA - Brazilian term) and other ministries struggled to build the National Agricultural Biodiversity Programme also called Conservation Program, Management and Sustainable Use of Agricultural Biodiversity (FAO, 2009).

According to the Non-Government "Terra de Direitos" - NGO (2011), via the Assessment and Monitoring Bulletin of the National Agricultural Biodiversity Programme, there are need for public policies that promote sustainable agriculture systems as a tool for the promotion of agro-ecological practices as traditional way conservation of biodiversity. The program's actions aiming strengthen existing experiences of use and conservation of agricultural biodiversity, encourage the creation of new experiences and their networking and the establishment of guidelines aimed at influencing public policies and legal frameworks in the subject (Non-Government Organization - NGO "Terra de Direitos", 2011).

Thus, when it uses the term "agro-biodiversity products" is intended to encompass all those with specific qualities linked rural area such as colonial products, traditional, artisanal, family farming, land, biodiversity and socio-biodiversity. It is worth noting issues of rescue, sustainable use, conservation and enhancement of agricultural biodiversity.

As an example of agro-biodiversity products there are sachets of dried herbs intended for use in teas, soft fresh herbs sold in street markets, liquid soaps derived from medicinal plants, jellies and sweet compote among other products developed by family farmers in the West Zone of Rio de Janeiro - Brazil.

Therefore, this study aimed to demonstrate the potential of the products of agricultural biodiversity through a tool for scenario analysis of knowledge known as SWOT analysis in order to subsidize decision makers in strategic planning.

## Method

This work originated from the experience of innovation management products of agricultural biodiversity derived from medicinal plants of the family farmers of western Rio de Janeiro area belonging to network PROFITO (Brazilian term referring to the Profito network wick established in July 2006 aiming to promote the implementation of production, processing and marketing of medicinal

plants in the Pedra Branca Massif agricultural communities - Rio de Janeiro / Brazil as an alternative to social development and environmental sustainability. This network belongs at Management Unit project Biodiversity and Health of Farmanguinhos (NGBS – Brazilian term) – FIOCRUZ. More information in [http://www.far.fiocruz.br/farmanguinhos/index.php?option=com\\_content&view=article&id=283:profito-se-reune-com-empresa-florestal-e-agricola&catid=53:outras-noticias&Itemid=94](http://www.far.fiocruz.br/farmanguinhos/index.php?option=com_content&view=article&id=283:profito-se-reune-com-empresa-florestal-e-agricola&catid=53:outras-noticias&Itemid=94)).

Data analysis on the market of medicinal plants and products of agricultural biodiversity were previously identified through the survey of scientific articles indexed in databases such as Scielo, PubMed, SCOPUS etc. Similarly, with respect to the market, official databases such as the Ministry of Health of Brazil (MS - Brazilian term), ANVISA and IMS Health. The terms used for research were “biodiversity”, “agricultural biodiversity”, “Biodiversity drugs”, “herbal medicines” and “agribusiness”.

After obtaining the data, it analyzed and highlighted major themes and sub-themes of agro-biodiversity, it was drawn a parallel with those derived from medicinal plants obtained of the family farmers of the West Zone of Rio de Janeiro whose database is available from PROFITO network.

In this sense, it was used the SWOT tool for better visualization of the results in order to better identify the FORCES (S), Weaknesses (W) Opportunities (O) and Threats (T) for products of Brazilian agro-biodiversity. The SWOT method can be seen in Figure 1.

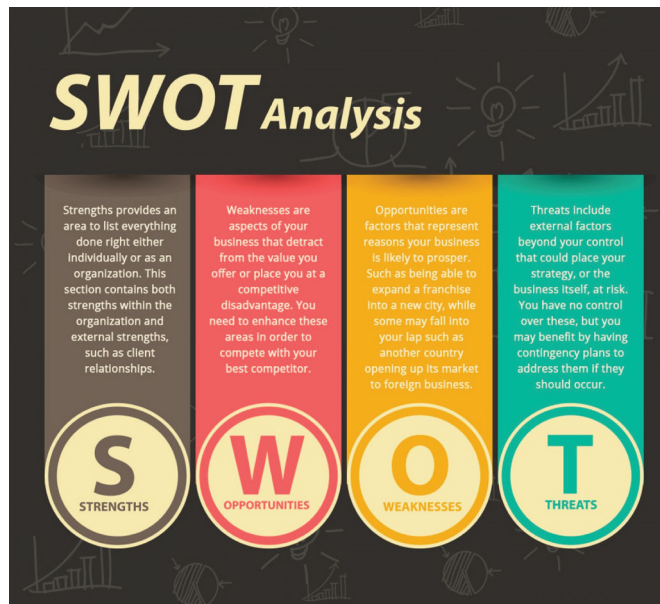


Figure 1: SWOT analysis. Source: Visual, 2014.

The SWOT analysis comes from the English acronym Strengths, Weaknesses, Opportunities and Threats. This technique was developed by Albert Humphrey (1960s) and is intended to be a tool used to make scenario analyzes or environment. It is consolidated in manage-

ment and strategic planning of organizations due to practicality in use. This analysis is used to the management of an activity of a company because the results of this analysis, it can check not only the status of organization but also its strategic position in the environment which it operates.

## Results and Discuss

### The herbal market

In the 21st century, the world began to observe the environmental dilemma in a universal dimension. Quality of life has become a public health issue and consequently the natural products have become a modern question as well as a symbol of a new era in the world consumption (Gomes, 2009).

Brazilian consumers have become more demanding and more aware. So, the search for new products with much better quality and lower cost become matched its profile, in view of that the current buyers have to take an active role in the market. The cause of this change of use and consumption is closely linked to the volume of information available from the internet and television besides the traditional “word of mouth” (Carlucci, 2014).

The associated values and concepts that underlie the consumer’s mind health food consolidate in health and quality of life. Since then the business in a global economy started to offer not only products but the responsibility for the environment and the establishment of “green policies” as a means of competitive advantage (Gomes, 2009).

According to surveys conducted by Gesellschaft für Konsumforschung (GfK) there are eight main factors that influence consumers in purchasing decisions, such as: 78% prior experience with the brand/retail; 70% samples/demonstration of products; 66% information on the shelves; 64% of general shopping sites; 63% of consumer reviews sites; 63% price comparison; 59% of the brand site and 57% opinion known (GfK, 2014).

The market for natural products is considered attractive because it has roots in the worldwide movement of contemporary society by the pursuit and aspiration for more and better quality of life, which is basically related to two major themes: health and environment (Gomes, 2009).

Consumption trends of these products leveraged the creation of niche markets settling mainly in urban centers in specialized shops. However, lately, it has gained a new dimension in large supermarket chains becoming a major segment in retail (Gomes, 2009).

Worldwide are sold more than 400 tons of medicinal and aromatic plants involving possible 53,000 species of plants (Schippman, Leaman & Cunningham, 2002). According to the country in analysis, up to 90% of such materials are harvested unsustainably. The natural habitat is even more pressing when the indiscriminate collection occurs or when the global commercial demand accelerates (Rosenberg, 2014). There are over 28,000 plants to the Convention on International Trade in Endangered Species Extinction (Cordeli, 2011).

Data from WHO Strategy on Traditional Medicine (2002-2005), shows that the use of traditional medicine is quite significant and is widespread throughout the world. Facts that support the strategic importance of supporting the conscious and sustainable use of medicinal plants aiming at the growth of this segment in the market (WHO, 2002).

Considering this growth, there are factors driving the market for natural products such as: consumers looking for products with favorable qualities to the environment, “chemical-free”; proliferation of specialized markets in raw materials focusing on the supply and quality control; shift the focus of trade, natural products are becoming final product, ready for use; growing interest in health and wellness and a greater amount of natural ingredients available.

Large companies seek innovation in their products to accompany the current demand in 21st century. An important feature for the product to be a differential in the market is to think of a proposal to reduce its chemical constituents, thinking about product life time and their disposal on the environment. Thus, they are seeking technologies from organic raw materials to meet the environmental problems and their causes reaching the choice of manufacturing materials as is technically possible and ecologically necessary. Nevertheless, Brazilian Government has promoted actions in recent decades for the Research, Development and Innovation (R,D&I) for medicinal products such as the Law of Generic Drugs, Innovation Law, Law of Good, Greater Brazil Plan, Profarma program of the National Bank for Economic and Social Development (BNDES) etc. (Magalhaes, Antunes & Boechat, 2012). It is worth mentioning investment policies also in the Brazilian health such as updating of the list of drugs used in the Unified Health System (SUS - Brazilian term) of the Brazil whose MS use this policy for dissemination strategy and so guides the Partnership for Production Development (PDP - Brazilian term) in Brazilian territory with public and private industries (Cartaxo, Antunes & Magalhães, 2014).

The market has developed products with more elaborate packaging, seeking innovation in biotechnology and nanotechnology (Alencar et al., 2012). In the cosmetics area there is a demand from companies for new excipients for the development of new formulations with different sensorial with green technologies to the reduce impacts on the environment. In this sense, to reduce using plastics and polymers to manufacture more functional packaging and so to be better preservation product and better performance in its application as well as biodegradable packaging.

In addition to the appeal of sustainability a good product is elected by the composition of raw materials so it is important concern for its disposal respecting the environment but must meet also the nature and understanding of the mechanism of action. Therefore, it is essential to understand the action of responsibility on the product and its application.

This new “green wave” is not restricted to the food industry. The cosmetics industry has invested heavily in product research on biodiversity assets and now occupy the same space on the shelves that products “unnatural” (Gomes, 2009).

According Yamada et al. (2004), consumers generally cannot tell what are the main differences between a natural cosmetics or organic, sustainable or to synthetic chemical. According to authors lack professional information transfer customer reliably.

Studies show that 84% of the American population is concerned with the current situation of nature and that this concern interferes with their buying habits; 54% read the packaging to verify that the product is environmentally friendly and 57% want to acquire products and packaging made from recycled material (SIMPOI, 2014).

This behavior is also being explored by Brazilians, although Brazil is a developing country, and the purchasing power does not always accompany the desire to purchase environmentally friendly products, which usually have a higher price.

In 2012, research conducted by GFK consultancy by magazine “Consumidor Moderno” quoted in SIMPOI annals (2014) shows that 27% of respondents indicated that give preference to brands/companies who defend any cause (environmental and/or social) even if the product price is higher than similar and 57% say they give preference to those brands/companies since the price is similar to other.

In the early 21st century the market has released the biocosmetics also known as phytocosmetic. Cosmetics considered “environmentally friendly” must necessarily be of natural origin and may be disseminated by organic or agroecological culture. Also, it made with ingredients that follow quality standards and sustainability established by certifying agencies able to guarantee consumers the quality of products purchased.

Brazil is favored in this segment due to its biodiversity as ingredients manager highly demanded by the global industry. However, is not large share in the market which is dominated by European and American companies. According to a report published in the Folha de São Paulo (News Magazine), in March 2014 says: “the segment of organic cosmetics, although they represent only 2% of the total market, already generates nearly US \$ 9 billion worldwide” (Freitas, 2014).

According to the Brazilian Association of Toiletries, Perfumes and Cosmetics, the Brazilian industry had an average growth of 10% annually over the last 18 years, going from a turnover “Ex-Factory”, net of sales taxes, US \$ 2 billion in 1996 to US \$ 17 billion in 2013. This fact, currently occupying the third position on the world market for personal hygiene, perfumery and cosmetics (ABIHPEC, 2014).

It is hoped that with this new concept of natural, sustainable product, agro-biodiversity products can win new segments and valuation retailers and specific markets. There is plenty of room to be exploited by small businesses, since large companies live the challenge to achieve a high volume of consumers to justify the investment. Thus, it is necessary to seek a new approach to innovation in health care, with improved access in all aspects of industrial health complex economic (Costa, Gadelha & Madonado, 2012).



## A Strategic Vision for SWOT Analysis

Given the fact above mentioned and by selecting the data collected by the methodology it was possible to build the SWOT matrix which enabled the definition of a strategy for R,D&I products derived from medicinal plants originating from agricultural biodiversity (Figure 2).



Figure 2: SWOT analysis of agro-biodiversity products derived from medicinal plants.

Source: Created by the authors, 2015.

Considering the scenarios of agro-biodiversity products by SWOT analysis above, it can highlight:

### a) Strengths:

- The products of agricultural biodiversity, value empirical knowledge and local farmers, considering that based on the participatory construction and the principles of popular education. Likewise, they make use friendly farming techniques, which provide a medicinal plant cultivation environmentally conscious, highly productive and economically sustainable. The production takes place in agro-ecosystems that provide greater integrity and sustainability of land resources (Gliessmasn, 2001).
- The use of agro-ecological practices for cultivation of medicinal plants does not require large areas, which makes the low cost of production, but requires hand labor intensive and careful management. Besides enabling a wide biodiversity within the same system, which is favored in Brazil be considered extremely diverse country.

### b) Weaknesses:

- There is a need for specialization of labor, work facing the demands of cultivation, propagation, collection and processing in the processing of medicinal plants to guarantee a final product with quality.

- There are projects that work helping farmers in running training courses. However not all producers of medicinal plants have access to these networks, and require hiring labor, skilled labor, rising costs in the marketing of products, and there is not always available, which generates an embezzlement in production.
- So that the product meets the quality standards and can safely reach the consumer follow-up is needed since the botanical identification to the development of the final product.
- Improper botanical control coupled with low productivity levels affect sustainability. Besides being necessary investments in machinery for the processing of medicinal plants, such as greenhouses and nurseries for seedling production, specific dryers and grinders for medicinal plants, as well as scales and sealing.

### c) Threats:

- Despite the diversity of products be considered a strength, the medicinal plants duty cycle is varied according to species, so there is no all species for marketing throughout the entire year.
- The producers of medicinal plants could act as vegetable raw material suppliers to industries, municipalities and / or large enterprises. But this mechanism is not considered good way, because the product does not have value and is a market with great middlemen who do not allow the entry of small producers, as is the case of family farmers. Family farming is characterized by production in diversity, so the direct suppliers of large companies and industries seeking resources with many small producers, farmers, for a lower price and earn great proportions in this market.
- In addition to these factors there is a regulation of these products demand, to ensure the sale in street markets and enable the introduction in pharmacies, health food stores and supermarket chains.
- There is an urgent need for a dialogue between farmers, research and extension institutions and standard-setting and regulatory agencies on problems and demands related to the processing and marketing of products from agricultural biodiversity, it is essential to rural development debates today. That's because to stay in rural are needed alternative sources of income for families and at the same time, there is a need to meet the requirements of environmental and health legislation by farmers, who now need this legislation to access new and promising markets.
- In the spaces of dialogue on agro-biodiversity products, especially with regard to the processing and marketing of products coming from family farming issues are discussed and the need for specific legislation for these farmers and their production processes, as the current standard does not They differentiate them from large industries and provides several interpretations. In this sense the debate on the quality always is present, from different perceptions, some extolling the health aspects such as product safety and other artisan preparation mode. The origin of the raw materials used in processing sites is another issue that shows the conflict between the laws that work on family farms.

**a) Opportunities:**

- Agrobiodiversity products reach a large portion of consumers for marketing in street markets, allowing a link between farmers, socializing knowledge, and bringing consumers the products, enabling explore new markets.
- As identified by Almeida & Albuquerque (2002), markets are open knowledge systems, because the information is often exchanged between the sellers and is usual to find among them a large consensus plants to treat a certain condition. The exchange of products is also common, whereas a seller may consult each other when a client does not find the desired product in its own stock.
- Well as discussed earlier, the market of medicinal plants is constantly growing, by more demanding consumers, seeking alternatives, environmentally sustainable and natural. Favoring new market niches facing the solidarity economy, which act directly in relation to traditional know-how and craftsmanship.

**Final Considerations**

Organizations should incorporate in all its activities the concept of innovation in order to remain in constant renewal, leadership, updating and searching this area to better management of costs and investments. One of the tools que assist the process of constant strategic analysis of practical, is the SWOT analysis. The object of this work, this proved effective Tools, pointing more opportunities and strengths for agricultural biodiversity than the Weaknesses and Threats.

Agrobiodiversity products reach a range of Consumers Attracted by better quality of life, seeking sustainability and value the tacit-explicit knowledge. These products are marketed through the fairs Primarily Aimed at solidarity economy. Thus Provides closer links between producers and Consumers.

**Acknowledgements**

The authors thank the master's program of the Institute of Technology in Drugs (Farmanguinhos/FIOCRUZ) and the National Counsel of Technological and Scientific Development (National Council for Scientific and Technological Development - Brazilian term).

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